

REMARKS

Claims 1-5, all the claims pending in the application, stand rejected. Claims 1-4 have been amended.

Specification

The Examiner notes that the application does not contain an Abstract of Disclosure. Applicant refers the Examiner to an Abstract appears at page 17 of the specification. A copy of this page is attached, in the event that the original page 17 had been misplaced by the USPTO.

Claim Objections

Claim 1 is objected to because it recites "said reflective film" in line 5. The Examiner concludes that there is no antecedent basis for this limitation. Applicant has amended claim 1 in order to overcome this objection.

Claim Rejections - 35 U.S.C. § 112

Claims 1-5 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. The Examiner points to claims 1 and 2 and finds that their statement of "the other side of the light guide" is unclear and ambiguous. Upon Applicant's review of claim 1 and a comparison with claim 2, it appears that certain text was inadvertently omitted from the originally filed claim 1. Also, while Applicant disagrees with the Examiner's conclusion that claim 2 is indefinite, Applicant has amended both claims for clarity. Similar amendments have been made to claims 3 and 4, even though they were not mentioned by the Examiner. In particular, Applicant has now described a "light guide plate having opposed sides" and has further referred to the "one opposed

side thereof" and "the other opposed side" in order to clearly relate to the structures illustrated and disclosed in the application. These claims now clearly define the invention.

Claim Rejections - 35 U.S.C. § 103

Claims 1-4 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tai et al (6,092,904). This rejection is traversed.

The present invention is an improvement over the prior art structure of Fig. 6, where a light source 101 directs light into the side of a light guide plate 102, that is formed of polycarbonate or acrylic resin, etc., has a multiplicity of prism-like grooves on one side of the plate 102 and has a reflective film 103 bonded to the prism-grooved side of the light guide plate 102. The improvement, as seen in several embodiments, involves the application of a wavelength converting layer, for example a layer 14 on the reflective film 13, as illustrated in Fig. 1. As described at page 8, the wavelength converting layer 14 of a first embodiment is formed by applying to the film 13 a solution of a wavelength converting material, such as a fluorescent material which is excited on exposure to ultraviolet rays from the light source. In a second embodiment, also represented by Fig. 1, the reflective film is made of a synthetic resin that includes a light storage material 15, which is in the form of a solution including a resin as a binder and is applied on the reflective film or incorporated in the reflective film, as disclosed at page 10. A further embodiment illustrated in Fig. 3 also include a light source 31, light guide plate 32 and reflective film 33 where a light storage material 34 is incorporated into the light guide plate 32. In the embodiment of Fig. 4, the light storage material 44 and light storage layer 45 are applied within and on top of the light guide plate 42, as explained at page 12. Finally, the

light storage layer, as illustrated in Fig. 5, may have a concentration that is increased depending upon the distance from the light source 51.

The novel features of these various embodiments are reflected in one or more of the pending claims.

The Examiner cites the patent to Tai et al for its teaching of a flat and transparent lighting system using microprisms. As is clear from the illustration in Fig. 1A, the system has no greater relevance to the present invention than that which is illustrated in the admitted prior art of Fig. 6. The reference includes a light source 64, which uses a light entry arrangement 28 to provide light to a light pipe 14, having on one side 36 an arrangement of micro prisms and on the other side a flat planar bottom surface 26. Light entering at surface 16 is transmitted through the pipe and is reflected from the back end surface 18. Along the way, light that enters microprisms 44 will be directed towards an object in a direction 38. A compensating plate 30, which has a contoured surface that matches the microprisms 44 on the light pipe 14, is coupled to the light pipe and forms assembly 10. The interface between the microprisms 44 on the light pipe and the surface of the compensating plate 30 have a air gap, as illustrated in Fig. 1B and disclosed at col. 6, line 47. The air gap may be replaced by a layer of plastic or other optical material, as disclosed at col. 7, line 15, such as cryolite, where the refraction index of polycarbonate and cryolite differ only slightly.

Clearly, none of this disclosure comprises a teaching of a reflective film with a wavelength converting material applied thereon. Further, there is no teaching of a light storage material applied to or otherwise blended with the light guide plate. As is clear from the

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illustration in Fig. 1A, there is no reflective layer in the disclosed structure of Tai et al. Even if the Examiner refers to the illustration in Fig. 15, where there appears to be a reflection of light from structure 106, a review of the disclosure at col. 11, line 35 reveals that the object is a DNA gel that is placed underneath the light pipe. Clearly, this is not intended to be a reflective layer as disclosed and claimed. Finally, the reference to UV illumination, which begins at col. 10, line 63, relates to the use of fluorescence of DNA in gels that are irradiated by UV illumination. There is no teaching or suggestion that fluorescent material may be used for light conversion. In particular, there is no teaching or suggestion that both light wavelength conversion and storage capability may be included in a surface illumination device, as disclosed and claimed.

On the basis of the foregoing, Applicant has not made any substantive amendments to the claims, other than to remove the basis for indefiniteness recited by the Examiner.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

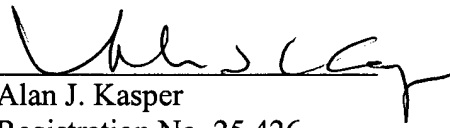
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APPENDIX
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims are amended as follows:

1. (Amended) A surface illuminant comprising a light source, a light guide plate having opposed sides which is optically coupled to said light source for emitting light incident from said light source through one opposed side thereof and a reflection film which is disposed on the other opposed side of said light guide plate, wherein a wave length converting material is applied on said reflective film.

2. (Amended) A surface illuminant comprising a light source, a light guide plate having opposed sides which is optically coupled to said light source for emitting light incident from said light source through one opposed side thereof; and a reflective film which is disposed on the other opposed side of said light guide plate, wherein said reflective film comprises a light storage material.

3. (Amended) A surface illuminant comprising a light source, a light guide plate having opposed sides which is optically coupled to said light source for emitting light incident from said light source through one opposed side thereof; and a reflective film which is disposed on the other opposed side of said light guide plate, wherein said light guide plate is made of a transparent material in which a light storage material is blended.

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4. (Amended) A surface illuminant comprising a light source, a light guide plate having opposed sides which is optically coupled to said light source for emitting light incident from said light source through one opposed side thereof; and a reflective film which is disposed on the other opposed side of said light guide plate, wherein a light storage film is formed on the surface of said light guide plate.